

A REVIEW OF THE GENUS *BOCCARDIA* CARAZZI (POLYCHAETA: SPIONIDAE) WITH DESCRIPTIONS OF TWO NEW SPECIES

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ABSTRACT: Taxonomic characteristics of 14 species of *Boccardia* are compiled in the form of a table. Each species is further distinguished in a key. *Boccardia ligERICA* Ferronniere is redescribed with new synonymies. Two new species, *B. berkeleyorum* and *B. chilensis* are described.

The present paper is fourth in a series on *Boccardia* taxonomy. The first three (Woodwick, 1963a; 1963b; Blake, 1966) dealt with *B. tricuspata*, *B. columbiana*, *B. proboscidea* and *B. hamata*. Adults were described and observations on ecology recorded. In the present study two species new to science are described. *Boccardia berkeleyorum* comes from central California while *B. chilensis* comes from the coast of Chile. In addition, *B. ligERICA*, a European species, is redescribed and new synonymies presented. Differential characteristics of known species of the genus are summarized in Table I. Analysis of the critical characteristics reveals that several well-defined groups of species are present. Discussion of these relationships follows the species descriptions.

Specimens of *Boccardia berkeleyorum* were collected by us during the years 1961-63. The *B. chilensis* material was included among the collections of the Lund University Chile Expedition 1948-49, the sedentary polychaetes of which are now at the Allan Hancock Foundation. We are grateful to Dr. Kristian Fauchald for the loan of his material. Specimens of *B. ligERICA* were kindly sent by the Zoological Museum of Amsterdam (ZMA) and Dr. Francois Rullier of the Université de Catholique, Angers, France.

Information included in Table I comes mostly from published sources. We are grateful to Dr. Bernard McAlice of the University of Maine for his translation of the article by Khlebovitsch.

This study was supported in part by N.S.F. Grants G-17990) and (GB-1264). Additional studies on *Boccardia* larval development have been completed and will be published in a subsequent paper.

SYSTEMATICS

Genus *Boccardia* Carazzi, 1893

Type species: *Boccardia polybranchia* (Haswell) 1885.

Synonyms: ?*Perialla* Kinberg, 1866.

Diagnosis: Prostomium rounded or bifid anteriorly, extending posteriorly as a caruncle. Eyes present or absent. First setigerous segment with or without notosetac. Setiger 5 greatly enlarged, with heavy spines of either one or two types, arranged in a curved row. Posterior notosetae may include specialized spines, hooks and/or simple capillaries. Hooded hooks begin on setiger 7. Branchiae begin on segments anterior to setiger 5 and are not fused to the notopodial lobes. Pygidium enlarged or reduced, saucerlike or divided into lobes.

The following species of *Boccardia* are herein considered valid and are included in Table I. Synonymies are in parentheses; asterisk indicates a new synonymy.

1. *B. basilaria* Hartman, 1961
2. *B. berkeleyorum* new species
3. *B. chilensis* new species
4. *B. columbiana* Berkeley, 1927
5. *B. hamata* (Webster), 1879
(*B. uncatata* Berkeley, 1927)
(*Polydora uncatiformis* Monro, 1938)
6. *B. ligERICA* Ferronniere, 1898
(**Polydora redeki* Horst, 1920)
7. *B. natrix* (Söderström), 1920
8. *B. perata* (Khlebovitsch), 1959
9. *B. polybranchia* (Haswell), 1885
10. *B. proboscidea* Hartman, 1940
(?*Spio californica* Fewkes, 1889)
(?*Polydora californica* Treadwell, 1914 HOMONYM)
11. *B. pseudonatrix* Day, 1961
12. *B. tricuspata* (Hartman), 1939
13. *B. truncata* Hartman, 1936
14. *B. sp.*

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(*Polydora redeki* sensu Okuda, 1937, not Horst, 1920)

Boccardia ligerica Ferronniere Emended

Figure 1

Boccardia ligerica Ferronniere, 1898; Fauvel, 1927; ?Day, 1955, 1967.

Polydora redeki Horst, 1920; Fauvel, 1927; Augener, 1939; Hempel, 1957a, 1957b; Rullier, 1960.

Material examined: Holland, Zuider Zee under rock, October 11, 1932, ZMA 1156 (30 specimens); France, Benouville, April 25, 1953, coll. François Rullier, (6 specimens).

Description: Complete specimens from Holland measure up to 12 mm and have about 70 segments. The French material contains only anterior fragments.

The prostomium is weakly bifid on its anterior margin (Fig. 1a). The caruncle extends posteriorly to setiger 2 or 3. There is no nuchal tentacle. There are 4 eyes; a widely spaced anterior cup-shaped pair, and a posterior pair closely spaced and oval in shape (Fig. 1a).

Setiger 1 is reduced; it has small notopodial lobes, no notosetae, and only a small fascicle of capillary neurosetae (Fig. 1a). Setigers 2, 3, 4, -, 6 and succeeding setigers contain spreading fascicles of winged capillary notosetae. The number of these setae diminishes in posterior setigers where they are replaced by stout capillary setae and a specialized recurved hook (Fig. 1g). The parapodia in posterior segments are modified in a manner similar to those of the closely related *B. hamata* (Blake, 1966). They are laterally elevated leaving a dorso-medial channel between them. The recurved notopodial hooks project medially towards this channel (Fig. 1i).

The neurosetae of setigers 2, 3, 4, -, and 6 contain fascicles of winged capillary setae. Bidentate hooded hooks which begin on setiger 7 largely replace the capillary setae. The hooks number 5 or 6 in a series with 1 or 2 ventral slender capillary setae. In posterior setigers the hooks number 2 or 3. The structure of the hooded hooks is similar to that of *B. hamata* (Blake, 1966). The 2 teeth have only a slight angle between them and there is no constriction on the shaft (Fig. 1h). Angle between the shaft and the main tooth is obtuse.

Setiger 5 is about twice as large as preceding and succeeding setigers. It is modified and contains a row of heavy spines (Fig. 1b) alternating with lanceolate companion setae (Fig. 1c-d). The heavy spines are simple, falcate and have no accessory structures. Dorsal to the row of heavy spines is a small group of stout geniculate setae (Fig. 1e) and

ventral to it is a small tuft of pointed geniculate setae (Fig. 1f).

Branchiae occur on setigers 2, 3, -, -, -, 7 and succeeding setigers for about one-third the length of the worm.

The pygidium consists of a flattened plate from which 2 anal cirri arise. The anus opens on the dorsal side (Fig. 1i).

Remarks: In the past *Polydora redeki* and *Boccardia ligerica* have been maintained as separate species as a result of the lack of complete specimens and confusion among investigators on the reported distribution of the branchiae. Most descriptions of the posterior segments have been incomplete.

Boccardia ligerica was described by Ferronniere (1898) from the Estuary of Loire, France. His general description and figures were adequate, but his observations on the branchiae were vague. His written description suggested that the anterior branchiae were distributed on setigers 2, 3, 4, -, -, 7 . . . , although his figures show anterior branchiae only on setigers 2 and 3. He adequately described the pygidium and clearly illustrated the two anal cirri, one of which appears to have been broken. Fauvel (1927) repeated Ferronniere's earlier description and Day (1955; 1967) in describing a South African specimen referred it with question to *B. ligerica*.

Polydora redeki was described from Holland by Horst (1920). His figures clearly show branchiae on setigers 2, 3, -, -, -, 7. Fauvel (1927) repeated Horst's description. Augener (1939) briefly described *P. redeki* from northern Germany. He figured the pygidium as a simple plate without processes. Friedrich (1938) did not add to the description. Hempel (1957b) did not describe the adult morphology in her paper on tube building. Rullier (1960) redescribed the species and for the first time elucidated the true structure of the pygidium. He reported the anterior branchiae as occurring on setigers 2, 3, 4, -, -, 7. The branchiae of setiger 4 were said to be smaller than on 2 and 3; however his figures do not show branchiae on setiger 4. His descriptions and illustrations of the post-larva stage of 14 setigers show the branchiae as being on setigers 2, 3, -, -, -, 7. Rullier's description and figure of the pygidium are like Ferronniere's figure for *B. ligerica*.

An examination of specimens from France collected and sent by Rullier and additional material from the Zuider Zee of Holland collected in 1937 proved that specimens from the two localities were the same. Only the material from Holland contain complete specimens. The anterior ends of the specimens from the two localities were identical. Branchiae were limited to setigers 2, 3, -, -, -, 7

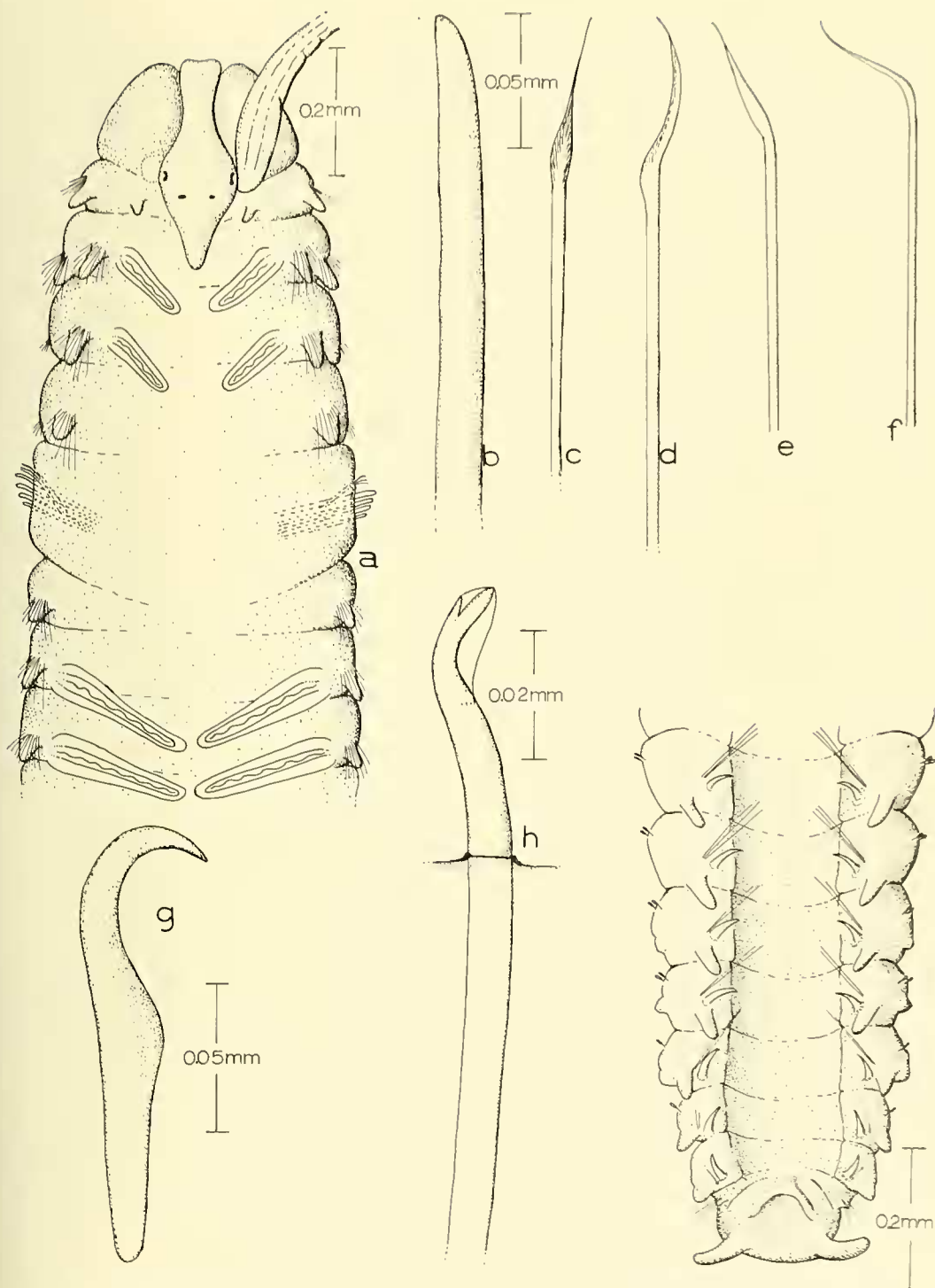


Figure 1. *Boccardia ligerica* Ferronniere: a, anterior end in dorsal view; b, heavy spine from setiger 5; c-d, companion setae from setiger 5; e, dorsal setae from setiger 5; f, neurosetae from setiger 5; g, posterior notopodial spine; h, hooded hook from setiger 10; i, posterior end in dorsal view.

With the absence of branchiae on setiger 4 of all specimens examined and the lack of any figures which show branchiae on that setiger from the published descriptions of Horst (1920), Ferronniere (1898) and Rullier (1960) we conclude that *Boccardia ligerica* and *B. redeki* are synonymous. Since *ligerica* is the older name, it has priority over *redeki*.

Okuda (1937) and Imajima and Hartman (1964) have described a species of *Boccardia* from Japan which was identified as *B. redeki*. It is closely related to *ligerica*, *hamata* and *truncata* but one important difference is the presence of a nuchal tentacle (Table I).

Hartman (1941; 1961; 1969) referred some posteriorly incomplete California specimens to *B. redeki*. *Boccardia ligerica* is closely related to *B. hamata*. The two differ in the structure of the pygidium and the distribution of the branchiae (Table I). Because *B. hamata* is common in California waters, it is possible that the incomplete specimens described by Hartman are *B. hamata*. *Ecology and distribution: Boccardia ligerica* occurs in brackish waters of mud flats of western Europe including Holland, France and Germany; ?South Africa. Associated organisms include the amphipods *Corophium volutator* Pallas and *C. lacustre* Vanhoffen and the polychaetes *Mercierella enigmatica* Fauvel, *Neanthes diversicolor* (O. F. Müller) and *Neanthes succinea* (Frey and Leuckart) (Rullier, 1960).

***Boccardia berkeleyorum*, new species**

Figure 2

Material examined: California: Cayucos, August 28, 1961, hermit crab shells, (8, TYPE); March 3 (2), April 28 (5), July 3, 1962 (8) from coralline algae; Morro Bay, October 24, 1961, from shells of *Pododesmus machroschisma* (Deshayes) (1); May 18, 1963, from *Pododesmus* (5); San Simeon Beach State Park, December 19, 1961, from hermit crab shells (1); Fort Bragg, June 20, 1962, from coralline algae (1); Eureka (Trinidad Head), June 21, 1962, from hermit crab shells (1).

The holotype is deposited in the Allan Hancock Foundation, University of Southern California and was collected at Cayucos (San Luis Obispo County) from burrows in *Tegula brunnea* (Philippi) occupied by the hermit crab, *Pagurus granosimanus* (Stimpson). The collections were made on August 28, 1961 from rocks at mid-tide level. Additional specimens taken at this station have been designated as paratypes and deposited in the Allan Hancock Foundation and the United States National Museum, Washington, D.C. Additional collections remain with the authors.

It is a pleasure to name this species in honor of

Edith and Cyril Berkeley who have made significant contributions to the systematics of polychaetes.

Description: Specimens in the present collections measure 5-14 mm and have up to 100 setigerous segments. There is no noticeable body pigmentation.

The prostomium is rounded on its anterior margin (Fig. 2a). The prostomial ridge is elevated and enlarged at the level of setiger 1; it continues posteriorly as a stout caruncle to near the posterior border of setiger 3. Palps on preserved specimens extend posteriorly to about setiger 12, but are much longer on live forms. There are no eyes.

Setiger 1 lacks both notosetae and a notopodial lobe (Fig. 2a). There is a small fascicle of slender capillary neurosetae and a bluntly rounded lobe on the first setiger. Setigers 2, 3, 4, -, 6 and succeeding setigers have posteriorly directed winged capillary notosetae arranged in 2 bundles. The second bundle has longer setae. In the posterior one-third of the body the winged capillary setae are replaced by longer capillary setae and heavy acicular spines (Fig. 2 j-k). The heavy spines are simple in structure and do not have the hooked appearance as in *B. hamata* and *B. ligerica*. The neuropodia of setigers 2, 3, 4, -, and 6 have fascicles of winged capillary setae. Bidentate hooded hooks begin on setiger 7. There are 5 or 6 hooks at first, accompanied by a single capillary seta. The number of hooks does not exceed 7 per neuropodium and in posterior setigers is reduced to 3 or 4. The hooks have 2 teeth nearly equal in size separated by an angle of about 90° (Fig. 2 h-i).

Setiger 5 is larger than preceding and succeeding setigers and contains modified setae (Fig. 2a). The dorsal setae are modified and include two types of heavy spines. The first is simple and falcate (Fig. 2 f-g). The second is bushy-topped and has a small accessory tooth (Fig. 2 b-e). Ventral to the heavy spines is a small tuft of capillary setae.

Branchiae are flattened and fingerlike in outline (Fig. 2a). They are small on setiger 2, 3, 4, -, 6 and 7, while those on 8 and succeeding setigers are much larger. Branchiae are reduced in size near the mid-body and are absent from the posterior one-fourth of the body.

The pygidium is composed of 4 small individual lobes which surround the anal opening (Fig. 2k). Variability in size of the pygidial lobes in the present specimens may be an artifact of preservation.

Remarks: The similarity between the modified setae of *Boccardia berkeleyorum* and *Polydora anophthalma* Rioja (1962) is apparent. Type material for *P. anophthalma* is no longer in existence precluding verification of its branchial distribution. Rioja did not describe the pygidium and ascribed the branchiae as beginning on setiger 8. He stated

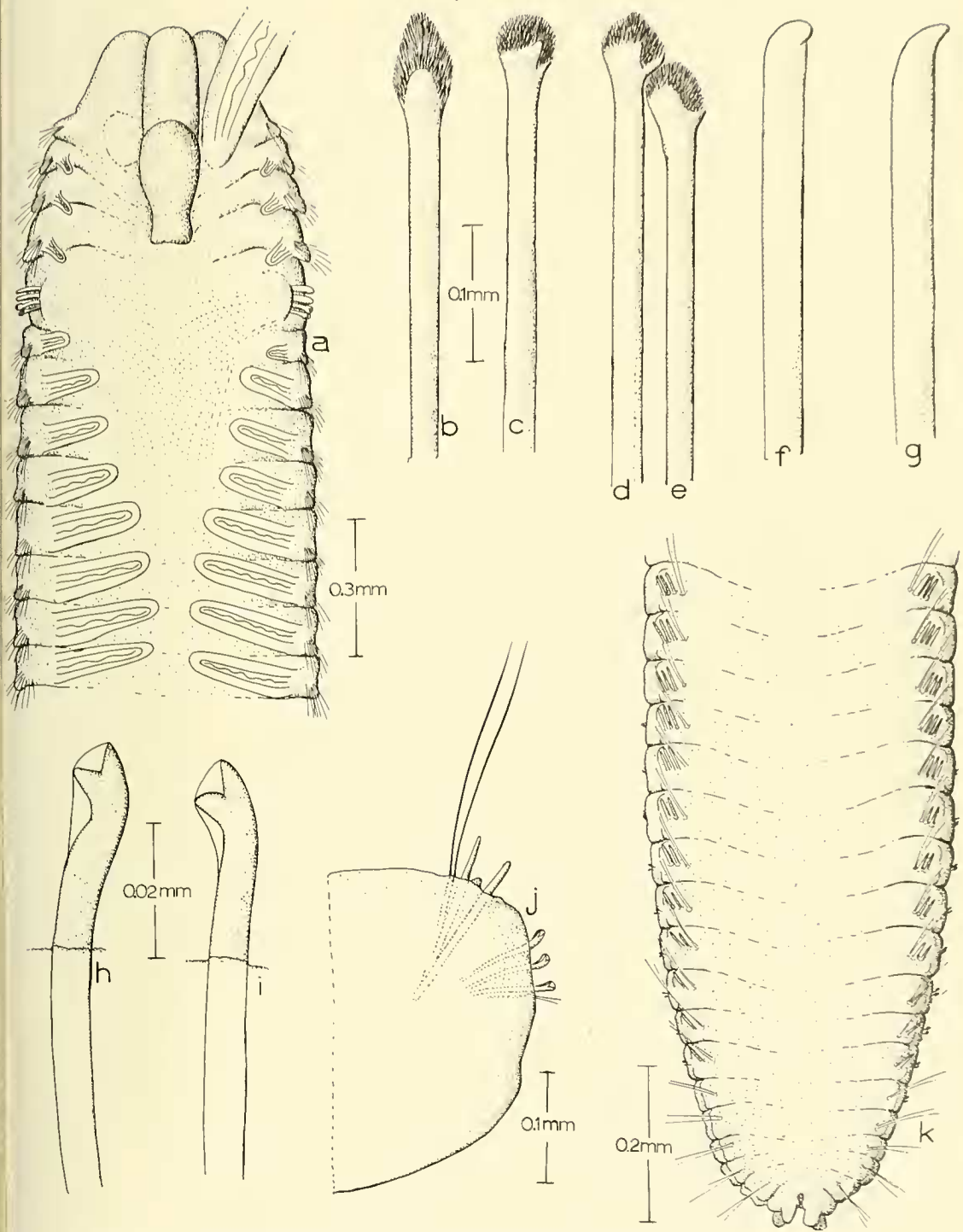


Figure 2. *Boccardia berkeleyorum* new species: a, anterior end in dorsal view; b-e, bristle-topped heavy spines from setiger 5; f-g, falcate spines from setiger 5; h-i, hooded hooks from setiger 12 seen at two angles; j, posterior setiger in posterior view; k, posterior end in dorsal view.

that posterior spines were absent. The bushy-topped setae which he described for the fifth setiger are very similar to those of *B. berkeleyorum*; however, the second type of setae are somewhat different. Rioja's figure 91 suggests a bifid nature. In *B. berkeleyorum* the second type has a simple falcate structure, but if viewed from a certain angle the beak of the spine may give a pseudo-bifid appearance.

Boccardia berkeleyorum is unique among species of the genus in the possession of special posterior spines which are acicular. In this respect it approaches certain species of the closely related genus *Polydora*. The species, *P. quadrilobata*, *P. caulleryi*, and *P. armata* each have awllike posterior spines but differ strikingly in the setation of the fifth setiger and lack of anterior branchiae, characteristic of species of the genus *Boccardia*.

The occurrence of different types of posterior spines throughout species of the polydorid complex may be the result of convergent evolution of species of various genera.

Ecology and distribution: *Boccardia berkeleyorum* was found in central California at Morro Bay, Cayucos, and San Simeon Beach State Park, and Fort Bragg and Trinidad Head in northern California. It was found in three different habitats with no apparent correlation with geographical location. This species was found in burrows in (1) the shells of *Tegula brunnea* Philippi inhabited by *Pagurus granosimanus* (Stimpson) (10 specimens at 3 stations), (2) shells of *Pododesmus machroschisma* (Deshayes) (6 specimens at 2 stations at Morro Bay), and (3) in low encrusting coralline algae of the genus *Lithothamnion* (11 specimens at 3 stations). Other polydorids found associated with *Boccardia berkeleyorum* include *B. columbiana*, *B. tricuspa*, and *Polydora* near *ciliata* in *Tegula*; *B. columbiana* and *B. tricuspa* in *Lithothamnion*; and *Polydora* sp. and *P. giardi* in *Pododesmus*. Other *Boccardia* were not found with it in *Pododesmus* material.

***Boccardia chilensis*, new species**

Figure 3

Boccardia sp. Hartman, 1948.

Polydora polybranchia Fauvel, 1916; *Not* Haswell, 1885.

Material examined: Chile, Lund University Chile Expedition 1948-49; Sta. 22, July 16, 1948, Golfo de Ancud, Isla Quenu, Punta Pinto, western side, sheltered intertidal, Lat. 41°49'15" S, Long. 73°10'15" W (2 fragments); Sta. M-121, June 9, 1949, Bahia San Vicente, Punta Liles just W. of San Vicente, semi-exposed intertidal, rocky, Lat. 36°43'36" S, Long. 73°08'10" W (3 specimens—HOLOTYPE and 2 PARATYPES); Sta. 131, July 1, 1949, Iquique, southern part of town, exposed rocky

intertidal, Lat. 20°13'10" S, Long. 70°10'19" W (1); Sta. M-133, July 7, 1949, Iquique, the harbor, sheltered rocky intertidal, Lat. 20°12'30" S, Long. 70°10'19" W (2); Bahia de Concepcion, central part, SE of Isla Quiriquina soft bottom trawl, depth 20 m, Lat. 36°40'15" S, Long. 73°01'48" W (1).

The holotype and 2 paratypes are deposited in the Swedish National Museum, Stockholm.

Description: Of the 9 specimens available for study the 3 types are well-preserved and adequately show diagnostic characteristics. The remaining specimens are poorly preserved and show clearly only the setal characteristics. The holotype is 28 mm long and has 125 segments. There is no body pigmentation.

The prostomium is bifid on its anterior margin and gradually narrows posteriorly to a point near the palpal insertions (Fig. 3a). An enlarged and raised area at about the level of the palpal insertions bears a nuchal tentacle (Fig. 3a). The caruncle extends to the posterior of setiger 2. An enlarged dorsal ridge occurs on some specimens from the anterior border of setiger 5 to near the posterior border of 6. Palps were missing on all specimens and were presumably lost at the time of preservation. There are no eyes.

Setiger 1 has capillary setae in both the noto- and neuropodia. Setigers 2, 3, 4, -, 6 and succeeding setigers have spreading fascicles of winged capillary notosetae arranged in 2 rows. The posterior row has longer and thinner setae. The number of these setae and the distinction between rows rapidly decreases on more posterior setigers. In far posterior setigers only a few laterally directed long capillary setae remain. The neuropodia of setigers 2, 3, 4, -, 6 have fascicles of winged capillary setae. Bidentate hooded hooks begin on setiger 7. Initially, there are up to 16 hooks per fascicle with the main fang of these hooks almost at a right angle to the shaft (Fig. 3g). In far posterior setigers the main fang is strongly bent and forms an acute angle with the shaft (Fig. 3h). In those setigers the hooks number only 8 or 9 per fascicle.

Setiger 5 is large and well-developed (Fig. 3a). There are two types of heavy spines arranged in a curved double row. The dorsally placed setae are simple falcate hooks with a hump at the point of curvature on the convex side (Fig. 3b). The ventral spines have a distal concavity from which arises a small cone (Fig. 3 c-f). The end of the shaft contains randomly dispersed fine "hairs". In certain views one side of the concavity is seen to be elevated as a delicate, transparent rim (Fig. 3 e-f). A small tuft of capillary setae occurs ventral to the major spines

Branchiae are fingerlike and occur on 2, 3, 4, -, 6 and succeeding setigers and continue to the poste-

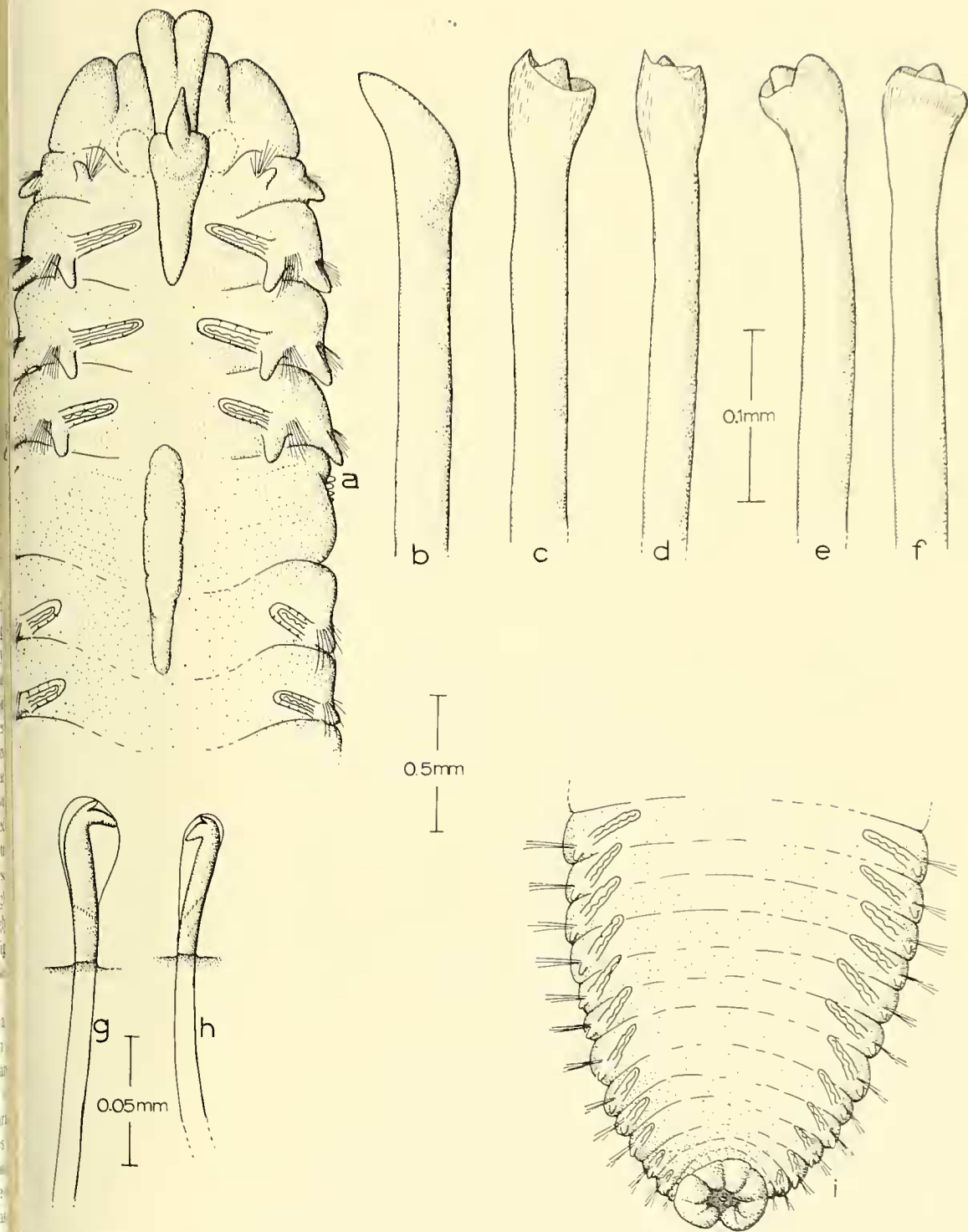


Figure 3. *Boccardia chilensis* new species: a, anterior end in dorsal view; b, humped falcate spines from setiger 5; c-f, spines from setiger 5 with distal concavity; g, hooded hook from setiger 12; h, hooded hook from a far posterior setiger; i, posterior end in dorsal view.

TABLE I. Some Taxonomic Characteristics of the Known Species of *Boccardia*

Species of <i>Boccardia</i>	Prostomial nuchal ridge a. prostomium b. caruncle c. eyes	Branchial distribution a. anterior b. posterior	Notosetae on Setiger 1	Posterior Notopodial Spines	Spines of Setiger 5 a. number of types b. description of types	Pygidium	Other Features	References
<i>basilaria</i>	a. incised b. to end of setiger 3 c. 4	a. 2, 3, 4, -, 6 b. absent posterior one-half	absent	absent	a. two b. 1. falcate 2. bristle-topped with constricted neck	semi-circular disc, with 2 ventral lappets	a. pouched glands in neuropodia of setigers 10-17 b. hooded hooks unidentate in posterior setigers	Hartman (1961; 1969)
<i>berkeleyorum</i>	a. rounded b. to end of setiger 4 c. 0	a. 2, 3, 4, -, 6 b. absent posterior one-fourth	absent	acicular	a. two b. 1. falcate 2. bristle-topped with accessory tooth	four small lobes	bores in calcareous materials	This paper
<i>chilensis</i>	a. incised b. into setiger 2 c. 0	a. 2, 3, 4, -, 6 b. present	present	absent	a. two b. 1. falcate 2. distal concavity	simple weakly lobed collar, ventrally incised	a. nuchal tentacle present b. up to 16 hooded hooks per neuropodium	This paper
<i>columbiana</i>	a. rounded b. to end of setiger 3 c. 4	a. 2, 3, 4, -, 6 b. absent last few setigers	long capillaries present in spreading fascicle	absent	a. two b. 1. falcate 2. bristle-topped	four equal lobes	—	Berkeley (1927) Woodwick (1963a)
<i>hamata</i>	a. incised b. to end of setiger 3 c. 4	a. 2, 3, -, -, 6 b. absent posterior one-fourth	absent	long falcate recurved hooks	a. one b. simple falcate	small ring with 2 ventral blade-like lappets each with a terminal process	dorso-median channel between posterior notopodia	Blake (1966)
<i>ligerica</i>	a. weakly incised b. to end of setiger 2 c. 4	a. 2, 3, -, -, 7 b. absent posterior two-thirds	absent	long falcate recurved hooks	a. one b. simple falcate	flattened plate with 2 terminal cirri	dorso-median channel between posterior notopodia; inhabits brackish waters	This paper
<i>matrix</i>	a. incised b. to end of setiger 2 c. 4	a. 2, 3, 4, -, 6 b. present	present	absent	a. two b. 1. falcate 2. bristle top with 2 heavy smooth bosses	four lobes	—	Söderström (1920) Hartman (1948)

TABLE I (CONTINUED). Some Taxonomic Characteristics of the Known Species of *Boccardia*

Species of <i>Boccardia</i>	Prostomial nuchal ridge a. prostomium b. caruncle c. eyes	Branchial distribution a. anterior b. posterior	Notosetae on Setiger 1	Posterior Notopodial Spines	Spines of Setiger 5 a. number of types b. description of types	Pygidium	Other Features	References
<i>B. taita</i>	a. incised b. into setiger 5 c. 3-6	a. 2, 3, 4, -, 6 b. absent posterior one-third	present	absent	a. two b. 1. falcate 2. bristle top and club-shaped	simple collar with several weak lobes	large forwardly-directed "lateral fans" on ventral side of setigers 1-4	Khlebovitsch (1959)
<i>B. ybranchia</i>	a. incised b. to end of setiger 3 c. 6-8	a. 2, 3, 4, -, 6 b. absent posterior one-half	absent	absent	a. two b. 1. falcate 2. inverted, bristle-topped cone with oblique base	disc-like	ventral oral groove to anterior of setiger 3	Carazzi (1893) Mesnil (1896) Fauvel (1927)
<i>B. bosciidea</i>	a. rounded b. to end of setiger 3 c. 4	a. 2, 3, 4, -, 6 b. absent last few setigers	present (short)	absent	a. two b. 1. simple falcate 2. bristle-topped	4 lobes dorsal pair smaller than ventral	pigment along prostomium; diverse habitats of shell, sand mud . . .	Hartman (1940; 1941) Woodwick (1963a)
<i>B. padonatrix</i>	a. incised b. to end of setiger 2 c. 2	a. 2, 3, 4, -, 6 b. absent posterior one-third	present	absent	a. two b. 1. simple falcate 2. central cone with raised margins	two flattened glandular cushions	palps barred	Day (1961; 1967)
<i>B. taita</i>	a. rounded b. to end of setiger 3 c. 4	a. 2, 3, 4, -, 6 b. absent posterior two-thirds	absent	absent	a. two b. 1. falcate 2. tricuspid	4 small lobes	bores in calcareous materials	Woodwick (1963b)
<i>B. taita</i>	a. incised b. to end of setiger 2 c. 4	a. 2, 3, 4, -, 6 b. absent posterior one-fifth	absent	absent	a. one b. simple falcate	disc-like with a dorsal gap	—	Hartman (1936; 1969)
<i>B. taita</i>	a. incised b. to end of setiger 3 c. 4	a. 2, 3, -, 6 b. absent posterior one-half	absent	?	a. one b. simple falcate	?	nuchal tentacle present	Okuda (1937)

rior end. Anteriorly they are longest on setigers 2, 3, and 4; they are shorter posterior to setiger 5 through the first one-third of the body and then are more elongate on succeeding segments with another gradual decrease in size near the pygidium.

The pygidium consists of a simple collar with a ventral incision or notch and further subdivision into several weakly developed lobes (Fig. 3i).

Remarks: The species is closely related to *B. tricuspa* (Hartman) and *B. pseudonatrix* Day. It is separated from those species and others of the genus by the characteristics listed in Table I. Fauvel (1916) reported *Polydora polybranchia* from the Falkland Island. His descriptions and figures are, however, clearly those of *B. chilensis*. Two figures show the anterior end with a nuchal tentacle and another figure shows the characteristic spines of setiger 5.

Ecology and distribution: The species was collected both intertidally and subtidally along the coast of Chile. In the intertidal it occurred both in protected and exposed rocky habitats.

KEY TO THE KNOWN SPECIES OF *BOCCARDIA* CARAZZI

- 1a Heavy spines of setiger 5 of one type, simple, falcate 2
- 1b Heavy spines of setiger 5 of two types, first type simple, falcate; second type highly modified 5
- 2a Nuchal tentacle present *B. sp.*
- 2b Nuchal tentacle absent 3
- 3a Recurved posterior spines present; pygidium with lappets or cirri 4
- 3b Recurved posterior spines absent; pygidium saucer-shaped *B. truncata*
- 4a Pygidium with 2 broad ventral lappets, each with a short process *B. hamata*
- 4b Pygidium with 2 long anal cirri *B. ligerica*
- 5a Second type of heavy spine of setiger 5 with dense bristles on the top 8
- 5b Second type of heavy spine of setiger 5 without dense bristles 6
- 6a Heavy spines of setiger 5 — falcate and tridentate; prostomium rounded *B. tricuspa*
- 6b Heavy spines of setiger 5 — falcate and with a distal concavity from which a cone or tooth arises; prostomium incised 7
- 7a Nuchal tentacle present; hooded hooks number up to 16 per neuropodium *B. chilensis*
- 7b Nuchal tentacle absent; hooded hooks number only 6 per neuropodium *B. pseudonatrix*

- 8a Prostomium rounded 9
- 8b Prostomium incised 11
- 9a Posterior acicular spines present; bristle-topped spines of setiger 5 with an accessory tooth; notosetae absent from setiger 1 *B. berkeleyorum*
- 9b Posterior acicular spines absent; no tooth on bristle-topped spines of setiger 5; notosetae present on setiger 1 10
- 10a Notosetae of setiger 1 long and in a fan-shaped fascicle *B. columbiana*
- 10b Notosetae of setiger 1 short *B. proboscidea*
- 11a Hooded hooks bidentate in anterior setigers, unidentate in posterior setigers; pygidium with 2 ventral lappets *B. basilaria*
- 11b Hooded hooks bidentate throughout; pygidium otherwise 12
- 12a Large forwardly directed lateral pouches on the ventral side of setigers 1-4 *B. perata*
- 12b Lateral pouches absent 13
- 13a Bristle-topped setae of setiger 5 with 2 heavy smooth bosses; notosetae present on setiger 1 *B. natrix*
- 13b Bristle-topped setae of setiger 5 with a conical tip with the bristles continued basally below the thickest region; notosetae absent on setiger 1 *B. polybranchia*

DISCUSSION

As discussed by Woodwick (1964: 156) "The generic breakdown of the polydorid forms has been unstable since the late 1800's and at the present time no one arrangement is accepted by all workers." According to Woodwick's scheme the polydorids may be divided into four genera: *Polydora sensu stricto*, *Pseudopolydora*, *Tripolydora* and *Boccardia*.

Fourteen species of the genus *Boccardia* are here considered valid. Their characteristics are compared in Table I and the species are delineated in the key. *Boccardia* sp. is an unnamed Japanese species [= *B. redeki sensu* Okuda, 1937]. The 14 species may be conveniently arranged into two natural groups based primarily on the setae of setiger 5. The groups are as follows:

- 1. Superior dorsal fascicle present on setiger 5; Spines of setiger 5 of one kind, simple and falcate.
 - B. hamata* *B. truncata*
 - B. ligerica* *B. sp.* [= *redeki sensu* Okuda, 1937]

H. Superior dorsal fascicle *absent* on setiger 5; Spines of setiger 5 of *two* kinds.

a. One spine simple falcate and second with one or more projecting cusps.

B. chilensis *B. tricuspa*

B. pseudonatrix

b. One spine simple falcate and second bristle-topped.

B. basilaria *B. perata*

B. berkeleyorum *B. polybranchia*

B. columbiana *B. proboscidea*

B. natrix

Two species of Group I (*ligerica* and *hamata*) have recurved posterior spines, while one species in Group II b (*berkeleyorum*) has acicular posterior spines.

Several species of the polydorid complex possess posterior notopodial spines. In some cases the species may be closely related but in others not, and their specialization in structure then suggests convergent evolution. *Polydora hoplura* Claparède and *P. colonia* Moore have recurved posterior spines similar to those of *Boccardia ligerica* and *hamata*, however the adult, and quite importantly, the larval morphologies are different in the four species. Posterior spines are such important diagnostic characteristics it would be helpful to learn more about their relation to the ecology of the respective species. Other polydorids known to have posterior spines include: *Polydora caulleryi* Mesnil, *P. quadrilobata* Jacobi, *P. armata* Langerhans, *P. cardalia* Berkeley, *P. caeca* Oersted, *Pseudopolydora corallicola* Woodwick and *Tripolydora spinosa* Woodwick.

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Accepted for publication September 25, 1970.

BULLETIN SO. CALIF. ACADEMY OF SCIENCES 70(1): 42-45, 1971

PARASITIC MITES OF SURINAM. VIII. A NEW GENUS AND SPECIES OF CHIGGER, *FAURANIUS ATECMARTUS*, AND ADDITIONAL RECORDS OF SPECIES (ACARINA: TROMBICULIDAE)¹

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ABSTRACT: Twenty-six species of chiggers are now known from Surinam. Nineteen are recorded here. *Fauranius* new genus is described for *F. atecmartus*, new species off *Philander opossum* and *F. myoproctae* (Fauran, 1960), new combination.

This paper augments a recent report (Brennan, 1970) in which 11 species of chiggers are recorded from Surinam. Fifteen additional species, one new, are recorded here. All material was collected by the junior author.

Two specimens of each species, as available, will be deposited in Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands, and National Collection of Surinam, Centraal Laboratorium, Paramaribo.

Fauranius, new genus

Type species: *Fauranius atecmartus*, new species. Neotropical trombiculine larvae. Leg segmen-

tation 6-6-6 (unique in subfamily Trombiculinae); 2 genualae I, sub- and parasubterminala, microtarsala I proximad of tarsala I, no genuala II and III, a tibiala III, no mastisetae. Scutum wider than long, the posterolateral setae extrascutal, sensillae probably expanded (as suggested by remaining stubs). Apparently, eyes may be present or absent.

¹Supported in part by Grant W83-1 from The Netherlands Foundation for the Advancement of Tropical Research.

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